
ENVIRONMENTAL Fact Sheet



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1,2-Dichloroethene: Health Information Summary

1,2-Dichloroethene (1,2-DCE) is a synthetic chemical with no known natural sources. It occurs in two forms known as *cis*- and *trans*- isomers that have similar properties. 1,2-DCE is a colorless, flammable liquid with a harsh odor. It is used as a chemical intermediate in the production of other chlorinated solvents. 1,2-DCE has also been used as a solvent in the extraction of rubber, to remove fats from meat and fish, and to decaffeinate coffee.

1,2-DCE may be released to the environment from manufacturing plants or from landfills where it had been disposed. It can be released to the air from the burning of vinyl. Because the 1,2-DCE isomers are environmental breakdown products of the widely used chlorinated solvents trichloroethene (TCE) and tetrachloroethene (PCE), 1,2-DCE's detection in groundwater may often be due to the release of the parent compounds into the environment.

Health Effects

Absorption

Inhalation absorption of 1,2-DCE by the body has been reported as about 75 percent in humans. No information is available regarding absorption of 1,2-DCE from ingestion or dermal exposure. The odor threshold for 1,2-DCE (*trans*-) in water is reported to be 0.26 parts per million (ppm); the reported odor threshold in air is 0.08 ppm. Evidence indicates that 1,2-DCE is eliminated by the body fairly rapidly so that it does not accumulate in tissues.

Short Term (Acute) Effects

At high concentrations, 1,2-DCE, like many other chlorinated ethene compounds, acts as an anesthetic resulting in central nervous system depression. Effects observed in humans include nausea, fatigue, vertigo, and drowsiness. Pathological changes to the heart were observed after rats were exposed to a high concentration (3,000 ppm) of 1,2-DCE by inhalation. After short-term exposure by rats via inhalation, effects on blood composition (reduced red blood cells and hematocrit) and pathological liver changes (fatty liver) were also noted.

Long term (Chronic) Effects

Following oral exposure in rats for three-months, effects on blood (decreased hematocrit and hemoglobin levels) were detected. In a three-month study in mice with exposure through drinking water, mild liver toxicity was observed at an exposure level of 175 milligrams of 1,2-DCE per kilogram of bodyweight per day (mg/kg/day).

Carcinogenic (cancer-causing) Effects

There are no data in humans or animals regarding the carcinogenic potential of 1,2-DCE. Both forms have been categorized by the EPA as Group D carcinogens (inadequate evidence to classify).

Developmental/Reproductive Effects

Researchers found no toxic changes to reproductive organs in both sexes of rats exposed orally to high levels (up to 1,900 mg/kg/day) of 1,2-DCE. Inhalation exposure to 1,2-DCE at 12,000 ppm by pregnant rats resulted in reduced fetal body weight. However, the fetal effect is believed to be a function of reduced food consumption and reduced weight gain in the mothers. There are no other reliable data regarding the ability of 1,2 DCE to alter developmental or reproductive functions.

Health Standards and Criteria

The EPA has established Maximum Contaminant Level Goals (MCLGs) for both the cis- and trans- isomers of 1,2-DCE in public drinking water systems. MCLGs are non-enforceable health standards for drinking water. MCLGs are set at a level at which no adverse health effects would be expected to result from the consumption of two liters (0.53 gallons) of contaminated water per day by a 70 kg (154 lb) adult. The MCLGs for cis-1,2-DCE and trans-1,2-DCE are 70 ppb and 100 ppb, respectively (ppb = micrograms per liter or ug/l).

The EPA has also established Maximum Contaminant Levels (MCLs) for both 1,2-DCE isomers in public drinking water systems. MCLs are enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and cost of treating contaminated water. The MCLs for cis-1,2-DCE and trans-1,2-DCE are also 70 ppb and 100 ppb, respectively.

The Occupational Safety and Health Administration (OSHA) enforceable standard (permissible exposure limit or PEL) for 1,2-DCE in workplace air is 200 ppm averaged over eight hours.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Fifth Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 1995.

Toxicological information on cis-1,2-DCE. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision December, 1990.

Toxicological information on trans-1,2-DCE. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision September, 1988.

Toxicological Profile for 1,2-Dichloroethene (Update). Agency for Toxic Substances and Disease Registry (ATSDR). Atlanta, GA. August, 1996.